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**Pregravid Weight, Prenatal Weight Gain
And Maternal Age As Risk Factors
In Pregnancy-Induced
Hypertension Development**

by

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B.S.N. May 1973, Villanova University**

**A Thesis Submitted to the Faculty of the Department
of Nursing of Old Dominion University in Partial
Fulfillment of the Requirements for the Degree of**

**Master of Science
(Nursing)**

**Old Dominion University
May, 1986**

Approved by:

Ellis Youngkin (Director)

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ABSTRACT

Pregravid Weight, Prenatal Weight Gain And Maternal Age As Risk Factors In Pregnancy-Induced Hypertension Development

Maryellen C. Remich
Old Dominion University, 1986
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This study examined whether the factors of pregravid weight, total prenatal weight gain at twenty-eight weeks and maternal age correlated with the development of pregnancy-induced hypertension in the third trimester. An ex post facto chart review of low risk primigravidas attending a public health maternity clinic was performed. A multiple regression correlation procedure demonstrated no significant correlation between the variables. Significant results of Chi-square tests of independence were demonstrated between low maternal age and pregnancy-induced hypertension development and between the failure of the mean arterial pressure to decrease in the second trimester and the development of pregnancy-induced hypertension in the last trimester. The researcher recommended that this study be replicated with a larger more heterogeneous sample in a prospective study to increase the ability to generalize the results to the target population.

DEDICATION

I would like to dedicate this thesis to my husband, Jim, and son, Steve. Without their love and support production of this thesis would have been impossible. I would also like to thank my parents who always believed I could do it.

ACKNOWLEDGEMENTS

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Chapter I

Introduction

Pregnancy-induced hypertension (PIH) is a disease peculiar to humans which has vague symptomatology and misleading criteria for assessing severity. A primary aim of prenatal care is early detection of PIH leading to prompt intervention to minimize or halt its progression.

Until the 1970's, the commonly accepted management of the well obstetrical patient was to limit prenatal weight gain to 15-20 pounds. This practice began when a 1917 editorial in the Journal of the American Medical Association noted a positive correlation between food availability and rates of eclampsia (PIH with convulsions) in World War I (Chesley, 1978). The practice was further legitimized by its inclusion in the 1945 edition of Williams Obstetrics (Chesley, 1978; Wheeler & Jones, 1981).

In 1972, the American College of Obstetricians and Gynecologists (ACOG) developed specific diagnostic criteria for all types of hypertension seen in pregnancy (Hughes, 1972). Prior to this, there were no commonly

accepted criteria. PIH was defined as not only absolute values of blood pressure, but also increases in blood pressure over first trimester readings (Hughes, 1972).

Intrauterine growth retardation is frequently seen as a dimension of PIH (Jones, 1975). Insufficient weight gain prenatally, particularly when coupled with low pregravid weight, carries a high risk for delivering a small-for-gestational-age infant (Eastman & Jackson, 1968). This leads to the question of a correlation between PIH and inadequate weight gain patterns.

Extremes in maternal age (less than 16 or greater than 35 years old) have been cited by many sources as a risk factor in PIH development (Jones, 1975; Duenhoelter, Jimenez & Baumann, 1975; Friedman & Neff, 1977; Willis, 1982; Willis & Sharp, 1982; Wheeler & Jones, 1981). Pregnancy in a client with chronic hypertension increases the risk of PIH (Willis & Sharp, 1982). Chronic hypertension is more prevalent as age increases (Public Health Service, 1984; Goroll, May & Mulley, 1981). This could account for the increased risk with older maternity clients. The reason for an increased risk to the client of low maternal age is unknown and cannot be totally attributed to race,

nutritional status and/or low socioeconomic status (Duenholter, et al., 1975).

Although maternal deaths from PIH have dropped significantly since the 1930's (Reeder, Mastriovanni & Martin, 1983), the incidence of PIH remains at 5-7%, higher in low socioeconomic groups (Jones, 1979; Willis, 1982). The fetal damage from PIH is hard to assess because statistics for infant morbidity and mortality do not list this classification. It is generally agreed to be high (Jones, 1979; Cruikshank, 1983) with one source estimating that PIH is responsible for 25,000 perinatal deaths each year (Russell & Shade, 1974).

The underlying pathology of PIH, severe peripheral vasospasm, causes hypertension, edema and proteinuria (Tichy & Chong, 1979). Visceral blood flow reduction leads to tissue hypoxia causing damage to all organs, most significantly the placenta (Pritchard & MacDonald, 1984). Histologic examinations of placentas in patients with PIH show a premature and exaggerated senescence (Tichy & Chong, 1979). Decreased placental blood flow from peripheral vasospasm causes increased fetal hypoxia, decreased nutrition and decreased amniotic fluid formation which can lead to many perinatal complications (Willis, 1982).

To nurses, the goal of prenatal care is more than the avoidance of morbidity and mortality, it is optimal wellness for mother, child and family. If the obstetrical nurse could use pregravid weight, prenatal weight gain and maternal age to identify clients at increased risk for developing PIH, these clients could be referred for more appropriate assessment and treatment. Clinical nurse educators could use this information to develop better teaching strategies aimed at prevention of PIH, such as disseminating this information to underweight women and encouraging quality weight gain prior to conception. Inservice nurse educators could increase the awareness among nurses of this high risk group, which because of the subtlety of PIH's symptomatology, is an important factor. Nurse administrators could better justify the expense and effort of comprehensive education for both prenatal patients and women considering future pregnancies.

Purpose

The purpose of this research was to explore whether patterns of prenatal weight gain, pregravid weight, and maternal age could be used for early detection of and intervention in PIH. With such knowledge, interventions such as bedrest could be initiated earlier when chances

of preventing severe PIH are greater. This would increase the probability of a healthy mother and baby at the termination of the pregnancy.

Problem Statement

Does a relationship exist between PIH development in the third trimester and pregravid weight, prenatal weight gain in the first two trimesters, and maternal age for primigravidas?

Theoretical Framework

General Systems Theory provided the theoretical framework for this research. As described by von Bertalanffy (1973), a system is a "set of elements standing in interrelation" (p.38). Systems can be open or closed. Closed systems are isolated from their environment while open systems exchange matter with the environment constantly building up and breaking down in response to the environment (von Bertalanffy, 1973). Each element, or subsystem of the system, has a specific function and is necessary to achieve the general purpose of the system (von Bertalanffy, 1973; Yura & Walsh, 1983).

The human body is a complex, open system whose output is growth and development. To produce output, the body must absorb input in the form of energy, matter or information (Yura and Walsh, 1983). During

pregnancy, input may include eating, drinking, breathing, and avoidance of harmful matter. As a subsystem of the pregnant body, the uteroplacental unit is designed to shuttle needed input between the mother and fetus. This subsystem works with the neurologic, respiratory, digestive and circulatory subsystems to meet the needs of the developing fetus. Any disturbance in input will effect all the subsystems and ultimately the output of the system. If the input into the woman's system is insufficient or inappropriate, the steady state is disturbed. Minimally, the result would be suboptimal growth and development of the fetus; maximally, it could produce illness or death of the woman or fetus.

Figure 1 depicts a model of the relationship of input to output using the General Systems Theory.

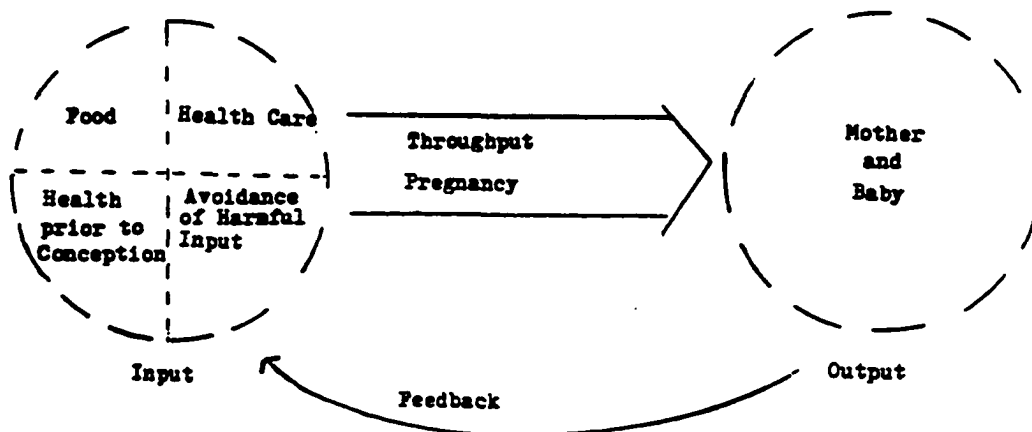


FIGURE 1 General Systems Model for Pregnancy

The input during pregnancy includes food, health care, health prior to conception and avoidance of harmful input. A client's prenatal weight gain is influenced by the food she eats. Pregravid weight and maternal age are reflections of the client's health prior to conception. The pregnant woman utilizes these and other inputs to produce a baby. The quality of these inputs affects the quality of the outputs. The baby's health and growth and development, as well as the health status of the mother both during and after her pregnancy, are the measurements of this quality. This research was designed to test this relationship.

Definition of Terms

For the purposes of this study the terms were defined as follows.

Low risk primigravida client:

- (1) first pregnancy;
- (2) no chronic or serious diseases (Jones, 1975);
- (3) no history of drug abuse;
- (4) no history of chronic hypertension (Willis & Sharp, 1982);
- (5) a mean arterial blood pressure ≤ 105 mm Hg at the first prenatal visit (Hughes, 1972);

- (6) first visit during or before 16 weeks of gestation (Pritchard & MacDonald, 1980);
- (7) during pregnancy no development of:
 - (a) gestational diabetes,
 - (b) hydatiform mole,
 - (c) fetal hydrops,
 - (d) hydramnios (Sonstegard, 1979).

Third trimester: 28 weeks of pregnancy until delivery.

Pregravid weight: The weight reported by the client as her weight before conception. This procedure is the commonly accepted practice for determining pregravid weight.

Pregravid weight ratio: The ideal weight was determined from the 1983 Metropolitan height and weight tables. The mid-point of the medium frame weight range for each height category was used. The height in the table included one inch heels. Adjustments for this were made since clients' heights were measured without shoes. The clients' heights were rounded to the nearest inch (see Appendix A). From this figure a ratio of actual to ideal weight was calculated.

Ideal weight ratio: greater than .8 to less than 1.2 (Naeye, 1979).

Weight at 28 weeks of pregnancy: The actual weight as recorded on the chart at the 28th week or the prorated weight at 28 weeks. The prorated weight was calculated as follows:

Weight at the first visit after twenty-eight (28) weeks minus the weight at last visit before twenty-eight weeks divided by the number of weeks between those two visits, times twenty-eight minus the number of weeks at the last visit before twenty-eight weeks, plus the weight at the last visit before twenty-eight weeks.

Ideal weight gain for first two trimesters: greater than 15 to less than 23 pounds. This represented a range of 80% to 120% of the optimal weight gain of nineteen pounds at the end of the second trimester (Naeye, 1979).

Pregnancy-induced hypertension: After twenty-eight (28) weeks of pregnancy:

- (1) a mean arterial pressure (MAP) increase of 20 mm Hg or more over the first MAP or,
- (2) a MAP value of 105 mm Hg or above (Hughes, 1972).

Mean arterial pressure was calculated by the

following formula:

$$\text{MAP} = \frac{\text{Systolic} + 2 (\text{Diastolic})}{3}$$

(Page & Christianson, 1976).

Mean arterial pressure difference (MAPD): The highest MAP recorded after 28 weeks minus the first MAP.

Mean arterial pressure 1 (MAP-1): The mean arterial pressure at the first prenatal visit.

Mean arterial pressure 2 (MAP-2): The average of the mean arterial pressures taken after 16 weeks and before 28 weeks.

Assumptions and Limitations

For the purposes of this study the following assumptions were made:

1. All of the objective data recorded on the charts meeting the criteria for the study were obtained accurately, and with calibrated and correctly functioning equipment.

2. The subjective data recorded on the chart accurately reflected the actual measurements (ie. pregravid weight, history).

The limitations of the study were the following.

1. Historical data was subject to reporting error on the part of the client.

2. The characteristics of the non-probability sample may have limited generalization to a specific population.

Review of the Literature

A thorough review of the literature revealed one citation, written in 1955, dealing directly with the topic of pregravid weight and prenatal weight gain as indicators of impending PIH. The other citations critiqued looked at weight, both pregravid and prenatal, and maternal age as indicators of pregnancy outcome. Tests using blood pressure readings in the second trimester as predictors of PIH were also reviewed.

Tompkins, Wiehl, & Mitchell (1955), in a study of sixty-five (65) pregnant women in Philadelphia found an increased risk, though not statistically significant, for toxemia (an obsolete term for PIH) in those whose pregravid weight was 20% over normal and 20% under normal, particularly if they failed to gain sufficient weight in the first two trimesters of their pregnancies. Toxemia was not defined. Normal weight gain for the first two trimesters was 12-16 pounds and normal pregravid weight was derived from the 1942 Metropolitan Insurance tables. The authors felt further study was needed with larger numbers of patients.

The most influential work done in the area of PIH was the Collaborative Perinatal Project (Friedman & Neff, 1977). This descriptive study used a sample of 53,500 pregnancies from twelve major hospitals in the northeast and mid-west. Definitions for criteria were very precise. However, the definition for PIH did not include increases in blood pressure over baseline. Diastolic pressure with proteinuria carried the most significant risk for perinatal mortality and morbidity in this study. Weight change and diastolic blood pressures were correlated with fetal deaths. Significant correlations occurred in the categories of; greater than one pound lost per week, less than one pound lost per week and less than one pound gained per week with diastolic pressures over 95 mm Hg. These are all less than optimal weight gains.

Other weight change effects studied showed positive correlation between amount of weight gained prenatally and ratios of birth weights greater than 2,500 gms. Pregravid weights (not correlated with height) of less than 116 pounds and greater than 155 pounds were highly significant ($p < 0.001$) for developing PIH. Large sample size and rigid application of statistics to the data make this study valuable.

Eastman & Jackson, (1968), studied 12,000 pregnancies for correlations between pregravid weight, not height dependent, weight gain and infant birthweight. Nearly linear correlations were graphed, supporting Friedman & Neff's conclusions. These authors recommended intervention at twenty weeks for insufficient weight gain.

Naeye (1979) used the data collected during the Collaborative Perinatal Project to test the hypothesis that optimal weight gain should be 24-27 pounds, employing perinatal deaths and infant and maternal disorders as criteria. Significant correlations in the low and normal pregravid weight groups were demonstrated. No correlation between weight gain and PIH was shown, but the criteria for PIH did not follow ACOG's criteria.

Second trimester mean arterial pressure (MAP) has been studied as a predictor of PIH (Page & Christianson, 1976). A sample size of 15,000 pregnancies was used in this ex post facto study. A $p < 0.01$ was demonstrated between a second trimester MAP over 90 and a MAP over 110 in the third trimester. A MAP over 110 is generally agreed to be hypertensive. Friedman & Neff, (1977) confirmed the predictive value of MAPs in their study.

Oney & Kaulhausen, (1983), also confirmed this increased risk associated with high second trimester MAPs, although they found a high rate of false positives. The criteria for PIH did not include rises in blood pressure levels as recommended by ACOG.

A seminal study for predictor tests for PIH is Gant, Chard, Worley, Whalley, Crosby & MacDonald's, (1974), study of the supine pressor test. The purpose was to discover if a correlation exists between the angiotension II infusion test and supine pressor responses. The assumption of the value of angiotension II infusion as a predictor is inferred. The sample population was a small selected group of low risk primigravidas from the Dallas area. The definition of PIH, though not in agreement with ACOG, was precisely defined. The patient's baseline blood pressure was determined while she lay in the left lateral position. She was then asked to roll over to the supine position in which another blood pressure was taken. An increase of 20 mm Hg diastolically was considered positive. The angiotension II infusion test was then performed. Over 90 percent agreement between the two tests was found in the fifty women tested. No correlational statistics were described, graphed, or level of significance

stated. Thureau, Dyers, Depp & Martin, 1983, replicated Gant's work as part of a larger study but were not able to duplicate his high percentage of agreement.

Singapolice, Feld & Harrigan, 1983, while noting the lack of concensus on the predictor value of the supine pressor test (roll-over), performed a quasi-experimental study to see if treatment would change the rate of development of PIH in thirty-two patients with positive roll-overs. Sixteen of these patients were instructed to increase bed rest by four hours a day in the left lateral position; otherwise all thirty-two patients were treated identically. PIH was defined in agreement with ACOG's definitions. In the untreated group 12 of 16 developed PIH as opposed to one in the treated group. No statistical analysis of the data was performed.

Friedman & Neff, (1977), also looked at the effects of maternal age in their study. Both age extremes showed a statistically significant correlation with development of PIH. Age extremes were defined as less than 20 and greater than 35 years old.

Duenhoelter, Jimenez & Baumann, (1975), looked at the pregnancy performance of 471 primigravidas under the age of 15 to determine if significant differences

existed between that group and a matched control group of primigravidas whose ages were 19 to 25. Groups were matched by race and socioeconomic status. Of the seven parameters studied, significant differences existed only in the incidence of PIH and pelvimetry inlet measures of less than 85%. Criteria for PIH diagnosis was not discussed.

The review of the literature demonstrated several points. First, pregravid weight and prenatal weight gain appear to be strong indicators of fetal outcome and, in one study, were linked to PIH development. Second, mean arterial pressures and the supine pressor test may be useful predictors of PIH development. Third, ACOG's criteria for PIH has not been used consistently in the previous research. This raises the question of underdiagnosis in those studies where other definitions were applied. Additionally, extremes in maternal age are thought to increase the risk of PIH development.

Null Hypothesis

There is no significant relationship between the factors of maternal age at the last menstrual period, pregravid weight ratio and total weight gained in the first two trimesters and the development of PIH in the

third trimester as measured by changes in the mean arterial pressure.

This chapter explored the question of whether the variables prenatal weight gain in the first two trimesters, pregravid weight, and maternal age can be used, either separately or combined, to predict impending PIH. The literature review suggested a relationship between intrauterine growth retardation and weight factors and intrauterine growth retardation and PIH. Extremes in maternal age were shown to correlate with PIH in the literature. This was developed within the framework of the General Systems Theory. The next chapter will discuss the methodology of data collection.

Chapter 2

Methodology

Research Design

This research was an ex post facto study designed to investigate patterns of pregravid weight, prenatal weight gain in the first two trimesters, and maternal age as predictors of pregnancy-induced hypertension in the third trimester. Ex post facto research involves data collection after variations have occurred in the natural course of events to determine if relationships exist between the variables (Polit & Hungler, 1983). By design, in ex post facto research, the independent variables cannot be manipulated, making direct observation of the effects of these manipulations impossible (Polit & Hungler, 1983). Because random assignment to experimental groups is not possible, undetected factors may result in a self-selection process which could influence the results. Both of these factors result in the inability to establish a causal relationship between study variables or to generalize the results of this research to other populations (Polit & Hungler, 1983).

Advantages of ex post facto research include, the ability to study multiple dependent variables simultaneously, the provision of a realistic setting for research, and the ability to gather a large amount of information in a small amount of time (Polit & Hungler, 1983). The intent of this study was not to establish causal relationships between study variables, but to discover if changes in the independent variables could predict significant change in the dependent variable. This supported the choice of an ex post facto research design.

Sample

The target population was all primigravidas in the United States. The accessible population was all primigravidas who had attended one public health clinic from January, 1983 to July, 1985. The group used for this study was the entire accessible population. Any client, whose chart was located, met the criteria for inclusion, and was delivered after January, 1983, and before July, 1985, was used in the study.

The population of clients who attended this public health clinic lived in a suburban-rural area in the southeastern United States. The proportion of black to white was high.

Setting

The setting was a maternity clinic in a public health department located in the southeastern United States. The clients seen in this clinic typically were of income levels which qualified them for financial assistance from the state. This clinic was selected because it afforded to the researcher a large number of primigravidas. The clinic record keeping was complete and organized in such a way that there was easy identification of the eligible charts and access to the pertinent information. Data collection involved a chart review which occurred between May 15 and July 5, 1985.

Tools

The physiologic measures of blood pressure, height and weight as well as demographic data were collected on the data collection sheet (see Appendix E). Blood pressure was converted to mean arterial pressure by the formula described by Page and Christianson (1976). Pregnancy-induced hypertension was defined as an increase in the MAP of twenty points or more from the first MAP to the highest MAP in the third trimester. This was derived from the definition of PIH developed by the American College of Obstetricians and Gynecologists (Hughes, 1972). The ideal weight ratio was calculated

from the Metropolitan Life Insurance tables, 1983, for ideal weight for height, the standard for this calculation.

The reliability of physiologic measures are generally considered to be one of their greatest assets (Polit & Hungler, 1983). Assuming correctly functioning equipment and technique, interrater reliability and test-retest reliability show a strong degree of agreement (Polit & Hungler, 1983). Construct validity of the measures is affected by the same problem as other data collection tools, the distortion of the measurement by the act of measuring (Polit & Hungler, 1983). Despite this, physiologic measures are still considered valid (Polit & Hungler, 1983).

Procedure

The research proposal was reviewed and approved by the Old Dominion University Department of Nursing Human Subjects Committee for the Protection of the Rights of Human Subjects before data collection was begun. Site approval was obtained after a letter of intent (see Appendix B), a short description of the study (see Appendix C), and the protocol were reviewed with the supervisor of the public health department. The director believed that the client's confidentiality was

maintained. The consent agreement was signed (see Appendix D).

The charts were collected by clinic personnel and reviewed by the researcher to determine which met the criteria for inclusion in the study. Those charts accepted were assigned an unrelated number which was recorded on the data collection sheet (see Appendix E), followed by the client's age, height, pregravid weight, demographic data and the weight and blood pressure readings at each visit. No names or other identifying information were recorded. Data collection was done in a private area to reduce the possibility of accidental inspection by a third party. After each chart was reviewed it was returned to the file by clinic personnel. When data collection was completed, the data collection sheet was reviewed by the clinic supervisor who verified that the identity of patients was not revealed by the information recorded. No individual data were used at any time. Data were presented in aggregate form only.

Individual consents were not obtained from the clients whose charts were included in the study. Benoliel and Berthold (1975) state that when stored data is obtained in the course of routine or professional

activities and collection does not involve any increased risk to the subjects, consent by subjects is not required. Additionally, it is the responsibility of the institution (ie. public health department) to determine if use of the data falls within the scope of its original consent. Data collection was begun on May 15, 1985, and was concluded July 5, 1985.

The pilot study was performed at the same site as the actual study. In this health department, each maternity patient was followed with an additional record designed to allow quick access to statistical information about each client's pregnancy, delivery and outcome. From these records the names of clients who met the criteria of being primigravidas and who were seen prior to the seventeenth week of pregnancy were located. Twelve charts were requested for the pilot study. Ten were located. Seven charts met the criteria for inclusion. The data collected included height, pregravid weight and the weights and blood pressures recorded at each prenatal visit, along with demographic data on the clients.

After concluding the pilot, changes were made in the data collection sheet (see Appendix E) to increase the space for transcription and include more space for

calculation. The changes in the definition of terms were as follows. Maternal age was defined as the client's age at her last menstrual period. This was the most easily identified age closest to the beginning of the pregnancy. When the client was not seen at 28 weeks, the weight was prorated by the formula described in the definition of terms. To exclude gross inaccuracy in the historical information of pregravid weight, it was decided that if a difference of greater than 15 pounds between the pregravid weight and the client's weight at the first visit existed, the chart would be excluded. The ideal weight gain at 16 weeks is 8 pounds (Pritchard & MacDonald, 1984). The seven extra pounds were added to make a total of 15 pounds because individuals often vary in their weight gain patterns and measurement variations between different scales often exist. To calculate the mean arterial pressure difference, the first MAP was subtracted from the highest MAP in the third trimester. This clinic did not convert blood pressure readings to MAPs. Significant increases in the MAP were not being followed with repeated readings because the blood pressure readings did not always appear to be elevated. Under normal

conditions, the MAP should not increase during pregnancy.

In this chapter information regarding the research design, sample, setting, tools and procedure were presented. In the next chapter, the results of data analysis will be discussed.

Chapter 3

Results

Analysis

This chapter presents the results of analysis of the data. The Statistical Package for Social Sciences (Nie, Hull, Jenkins, Steinbrenner & Brent, 1975) was used for all calculations except Chi-square testing. Initial data analysis consisted of examining the demographic characteristics of the sample (n=76). Data on age at the last menstrual period, race, and marital status were also collected. These descriptive data were compared with data supplied by the National Center for Health Statistics, 1984, (see Table 1). Ninety-two percent of the maternity clients seen in this clinic were considered either indigent or in need of financial assistance by the state in which the study was conducted, placing them at high risk based on the variable of socioeconomic status. Low socioeconomic status was considered a high risk factor for PIH in some of the literature. A 27.3% rate of PIH in the study group corresponds closely with the 30% rate cited in the literature for low socio-economic groups (Jones, 1979).

Table 1

Race, Marital Status and Age of Sample (n=76)

Characteristic	Groups	Number and Percentage	National Averages
Race	Black	42 (55)	15% ^{3,4}
	White	34 (45)	82% ^{3,4,5}
	Other	0	3% ^{3,4}
Marital Status ¹	Single	50 (66)	24% ^{3,4}
	Married	26 (34)	
Age ²	Mean Age	18.9	23 ^{3,4}
	≤16	8 (10)	
	>16	68 (90)	

Note: Percentages rounded to nearest whole number .

1 Marital status at first prenatal visit

2 Age at last menstrual period

3 Computed from statistics in Vital Statistics of the United States,
1980, Natality (National Center, 1984)

4 Data collected with first live birth

5 Did not include non-Caucasian racial groups

Multiple correlation and regression strategies permit exploration of the simultaneous effects of two or more independent variables on a dependent variable with the dependent variable measured on an interval or ratio

scale (Polit & Hungler, 1983). The null hypothesis was analyzed by a multiple regression procedure.

Findings

Table 1 displays the demographic data of age, race and marital status. Also shown is the national average for the same data. The sample size was 76 with a mean age of 18.9 years. Eight (10%) were 16 or less and 68 (90%) were older than 16 at their last menstrual period. No client was older than 35. Thirty-four (45%) of the sample were white, while 42 (55%) of the sample were black. Twenty-six (34%) were married; 50 (66%) were single. None of the sample was widowed or divorced.

The criterion variable, mean arterial pressure difference (MAPD) ranged from 0 to 43.4. Fifty-six (74%) had a MAPD of less than 20, negative for PIH, and 20 (26%) of the MAPDs were greater than or equal to 20, positive for PIH. The mean MAPD was 13.1 (see Table 2).

Pregravid weight ratio had a mean value of 0.997 and standard deviation of 0.218. The definition of extremes in pregravid weight ratio was less than or equal to 80% or greater than or equal to 120%, one standard deviation away from the mean. Nine clients (12%) had a low extreme pregravid weight ratio and 15 (20%) were high extreme. In this study, nineteen pounds

Table 2

Pregravid Weight Ratio, Prenatal Weight Gain, MAPD, MAP-1 and MAP-2 of
Sample (n=76)

Variable	Percentage	Range of	Mean	Standard	Median
		Values			
Pregravid Weight Ratio		.66-1.57	0.99	0.22	0.94
$\leq .8$	9(12%)				
$>.8$ to <1.2	52(68%)				
≥ 1.2	15(20%)				
Prenatal Weight Gain (lbs)		0-46.7	19.52	9.31	19.52
≤ 15	21(28%)				
>15 to <23	29(38%)				
≥ 23	26(34%)				
MAPD					
<20	56(74%)	0-43.4	13.10	9.592	12.05
≥ 20	20(26%)				
MAP-1		54.0-90.7	70.92	15.46	73.25
MAP-2		48.7-88.7	70.33	13.03	71.55
MAP-1 minus MAP-2					
≤ 0	35(41%)				
>0	41(59%)				

was considered to be the appropriate weight gain at 28 weeks of pregnancy (Naeye, 1979). The variable of prenatal weight gain in the first two trimesters had a mean of 19.52 pounds with a standard deviation of 9.31 pounds. Twenty-one (28%) had weight gains less than or

equal to 15 pounds and 26 (34%) had gains of greater than or equal to 23 pounds. The mean arterial pressure in the first trimester (MAP-1) averaged 70.92 with a standard deviation of 15.46. MAP for the second trimester (MAP-2) averaged 70.33 with a standard deviation of 13.03. MAP-1 was subtracted from MAP-2 to determine if the MAP dropped during the second trimester. Numbers with values of zero or less indicated that the MAP had stayed the same or risen. Thirty-five (41%) were zero or negative while 41 were positive values (59%).

The null hypothesis was analyzed using a stepwise multiple regression correlation model as shown in Table 3. No significant correlation was found between the variables of pregravid weight, prenatal weight gain and maternal age when correlated with PIH development at the .05 level of significance, therefore, the null hypothesis was accepted.

The literature supported the concept that extremes in pregravid weight ratio, prenatal weight gains, and maternal age increased the risk of development of PIH (Tompkins, et al., 1955; Duenholter, et al., 1975). To explore this possibility, several Chi-square tests for independence were performed. First, clients were ranked

Table 3

Stepwise Multiple Regression of MAPD with Pregravid Weight Ratio,
Prenatal Weight Gain and Maternal Age (n=76)

Step and Variable	Multiple R	R Squared	F-value	Significance
1 Maternal age	0.022	0.05	3.90	$p > .10$
2 Prenatal weight gain	0.024	0.06	2.28	$p > .10$
3 Pregravid weight ratio	0.026	0.07	1.76	$p > .10$

into three groups on the basis of pregravid weight ratio; higher than or equal to 1.2, between 0.8 and 1.2, and lower than or equal to 0.8. The high and low group were combined and labeled as pregravid weight ratio extremes. A 2x2 contingency table was constructed and a Chi-square statistic calculated for the incidence of a MAPD equal to or greater than 20 among these two groups. Daniels' abbreviated formula for calculating the Chi-square statistic from a 2x2 contingency table was used (1983, p. 372). The result was nonsignificant ($\chi^2 = 0.20$, $df = 1$, $p > .5$). Next, the clients were ranked on the basis of prenatal weight gain. The high group consisted of clients who had gained 23 pounds or more at

28 weeks of pregnancy. The middle group was formed from clients who had gained from 15.1 to 22.9 pounds at 28 weeks. The low group was made up of those clients who had gained 15 pounds or less at the end of the second trimester. Again, the high and low groups were combined and labeled extremes in prenatal weight gain. A 2x2 contingency table was constructed and a Chi-square statistic was calculated for the incidence of a MAPD equal to or greater than 20 among these two groups of prenatal weight extremes. The result was nonsignificant ($\chi^2 = 0.11$, $df = 1$, $p > .7$). Daniels' formula was used.

Maternal age was converted into a dichotomous variable: less than or equal to age 16 at the last menstrual period, or greater than 16 at the last menstrual period. There were no clients over 35 years of age. A 2x2 contingency table was constructed and a Chi-square statistic calculated for the difference between expected and observed frequencies in the MAPD and maternal age. A significant difference was found (see Table 4) when Daniels' formula was utilized.

Page and Christianson, 1976, found that a mean arterial pressure (MAP) of 90 or greater in the second trimester predicted a MAP of greater than 110 in the third trimester, a MAP considered positive for PIH by

Table 4

A 2x2 Contingency Table and Chi-Square Test of MAPD with Maternal Age

	MAP <20	MAP ≥ 20
Maternal Age ≤16 (n=8)	3	5
Maternal Age >16 (n=68)	53	15
Totals	20	56

$$\chi^2 = 6.22, df = 1, p < .025.$$

the American College of Obstetricians and Gynecologists (Hughes, 1972). Blood pressure normally decreases during pregnancy with the lowest levels being reached during the second trimester, rising again in the third trimester to the baseline level (Page & Christianson, 1976). Considering these two facts, this researcher explored whether a failure to have lower MAP readings in the second trimester over the baseline reading was associated with PIH, as shown by an increase in the MAP

of 20 points or more after twenty-eight weeks. A Chi-square statistic was calculated from this data. A significant result was found (see Table 5).

In this chapter, the findings of the research were presented. The null hypothesis of the study was accepted. A significant finding was an association between low maternal age and the development of PIH. Also, if the MAP failed to decrease during the second trimester, the client was at risk for PIH development in the third trimester. Conclusions and recommendations for further research are presented in the next chapter.

Table 5

A 2x2 Contingency Table and Chi-Square Test of the MAPD with the Failure to Decrease the MAP during the Second Trimester (n=76)

	No Decrease in the MAP	Decrease in the MAP
MAP < 20 (n=56)	21	35
MAP ≥ 20 (n=20)	14	6
Totals	36	41

$$\chi^2 = 6.09, df = 1, p < .025$$

Chapter 4

Discussion

Conclusions

The purpose of this study was to explore if maternal age, pregravid weight and prenatal weight gain correlated with the development of PIH. No significant correlation was found. Chi-square tests for independence were then calculated for the frequency of a MAPD greater than or equal to 20 and extremes in pregravid weight ratio, extremes in prenatal weight gain and low maternal age. Each group was analyzed separately. A significant result was found when a Chi-squared statistic was calculated for the MAPD and low maternal age. Several sources (Freedman & Ness, 1977; Duenhoelter, et al, 1975, 1975; Pritchard & MacDonald, 1984) cited low maternal age as a major risk factor in the development of PIH. This study confirmed those findings. A significant Chi-square test result between the failure of the MAP to decrease in the second trimester and PIH development in the third was found. This finding supports the findings of Page and Christianson, (1976).

In this study women who were at increased risk for PIH development were 16 years or younger at the time of conception. Also, any woman, regardless of age or weight factors, whose mean arterial pressure did not drop during the second trimester was at high risk of PIH development during the third trimester.

Recommendations

This researcher recommends that this study be replicated with a prospective design using a larger, more heterogeneous sample of the target population of primigravid women in the United States. A prospective rather than retrospective design would allow the researcher to exert more control over the independent variables (i.e., frequency of blood pressure readings, more exact height to weight ratios). The sample used in this study differed significantly from the target population, limiting the ability to generalize the findings to the target population. A stratified sample would decrease this threat to external validity.

Weight and weight gain are multifaceted variables. The quality of a client's diet may be more influential than the factor of weight gain alone in the development of PIH. This concept of nutrition and weight gain has been reviewed extensively by Chesley

(1978). He proposed that diet alone has not proven to be the cause of or a predisposing factor in PIH development. Riberio (1982), though, stated that the lack of consistent definitions of PIH in earlier studies, as well as lack of precision in the research, makes most of the conclusions drawn from previous studies questionable. He proposed that this factor be reexplored.

Recent studies have explored specific dietary factors. Findings from one study showed that calcium may be a factor in PIH development (Belgan & Villar, 1980). Chung, Davis, Ma, Navivikul, Williams and Wilson (1979), observed that the total lipid and cholesterol intake was very high in pregnant subjects who developed toxemia. Dietary supplementation with the essential fatty acid precursors of prostaglandin E₁ has been proposed as a nutritional means of reducing the incidence of PIH by McCarty (1982). The researcher believes that, in future studies, specific dietary factors which could be associated with PIH development should be explored.

The literature review demonstrated a lack of consistency in the definition of PIH. It was either not defined or the definition varied between studies. This

lack of consistency was a hindrance to drawing conclusions about PIH from the literature reviewed. An authoritative criteria for diagnosis of PIH currently exists. Consistent use of one definition in future studies is required to make research related to PIH more efficient and productive.

The goal of obstetrical nursing care is the optimum wellness of the mother, child and family. The nurse monitors the pregnant woman for signs of actual or potential physiologic disturbance within her body. Nurses and the entire health care team are expected to respond appropriately to these signals in order to restore equilibrium within the client's body system.

In this study, when the maternal age was low, the risk of PIH was higher. These clients should be classified as high risk for PIH and treated as such by the nurses and the health team. Also, when clients' MAPs fail to decrease in the middle trimester, they should be reclassified as high-risk and watched closely for PIH signs and symptoms. Hopefully, these reassessments will minimize the stress of PIH on the mother, fetus and family, which is a goal of obstetrical nursing.

Bibliography

- Belizan, J. M., & Vellar, J. (1980). The relationship between calcium intake and edema-, proteinuria-, and hypertension-gestosis: A hypothesis. American Journal of Clinical Nutrition, 33, 2202-2210.
- Benoliel, J. Q., & Berthold, S. (1975). Human rights guidelines for nurses in clinical and other research. Publication Code No. D-46 5m 7/75. Kansas City, MI: ANA.
- Chesley, L. C. (1978). Hypertensive disorders in pregnancy. New York: Appleton-Century-Crofts.
- Chung, R., Davis, H., Ma, Y., Naivikul, O., Williams, C., & Wilson, K. (1979). Diet-related toxemia in pregnancy I: Fat, fatty acids and cholesterol. American Journal of Clinical Nutrition, 32, 1902-1911.
- Cruikshank, D. P. (Ed.). (1983). MCV perinatal letter, II (5). Richmond: Medical College of Virginia, Departments of Obstetrics, Gynecology and Pediatrics.
- Daniel, W. W. (1983). Biostatistics: A foundation for analysis in the health sciences. (3rd ed.). New York: John Wiley & Sons.
- Duenhoelter, J. H., Jimenez, J. M., & Baumann, G. (1975). Pregnancy Performance of Patients Under Fifteen Years of Age. Obstetrics and Gynecology, 46 (1), 49-52.
- Eastman, N. J. & Jackson, E. (1968). Weight relationships in pregnancy: The bearing of maternal weight gain and prepregnancy weight on birth weight in full term pregnancies. Obstetrical and Gynecological Survey, 23, 1003-1025.
- Friedman, E. A., Neff, R. K. (1977). Pregnancy hypertension: A systematic evaluation of clinical diagnostic criteria. Littleton, MA: PSG Publishing.

- Gant, N. F., Chard, S., Worley, R. J., Whalley, P. J., Crosby, U. D., MacDonald, P. C. (1974). A clinical test useful for predicting the development of acute hypertension in pregnancy. American Journal of Obstetrics and Gynecology, 120, 1-7.
- Goroll, A. H., May, L. A., Mulley, A. G. (1981). Primary care medicine: Office evaluation and management of the adult patient. Philadelphia: Lippincott.
- Hughes, E. C. (Ed). (1972). Obstetric-gynecologic terminology with section on neonatology and glossary of congenital anomalies. Philadelphia: F. A. Davis.
- Jones, M. B. (1979). Hypertensive Disorders of Pregnancy. Journal of Obstetric, Gynecologic and Neonatal Nursing, 8, 92-96.
- Jones, M. B. (1975). Antepartum Assessment in High Risk Pregnancy. Journal of Obstetric, Gynecologic and Neonatal Nursing, 4 (6), 23-27.
- McCarty, M. F. (1982). Nutritional prevention of pre-eclampsia - A special role for 1 series prostaglandin precursors? Medical Hypothesis, 9, 283-291.
- Naeye, R. L., (1976). Weight gain and the outcome of pregnancy. American Journal of Obstetrics and Gynecology, 135, 3-9.
- National Center for Health Statistics. (1984). Vital statistics of the United States 1980: Natality, 1 (DHHS Publication No. PHS 85-1100). Washington, D.C.: U.S. Government Printing Office.
- Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K. & Bent, D. H. (1975). Statistical package for the social sciences (2nd ed.). New York: McGraw-Hill.

- Oney, T., & Kaulhausen H. (1983). The value of the mean arterial blood pressure in the second trimester as a predictor of pregnancy-induced hypertension and preeclampsia: A preliminary report. Clinical and Experimental Hypertension, 2, 211-216.
- Page, E. W., & Christianson, R. (1976). The impact of mean arterial pressure in the middle trimester upon the outcome of pregnancy. American Journal of Obstetrics and Gynecology, 125, 740-746.
- Polit, D. & Hungler, B. (1983). Nursing research: Principles and methods (2nd ed.). Philadelphia: Lippincott.
- Pritchard, J. A., & MacDonald, P. C. (1984). Williams Obstetrics (17th ed.). New York: Appleton, Century Croft.
- Public Health Service (1984). The 1984 report of the joint national committee on detection, evaluation and treatment of high blood pressure. (NIH Publication No. 84-1088).
- Reeder, S. J., Mastriovanni, L., & Martin, L. L. (1983). Maternity Nursing (15th ed.). Philadelphia: Lippincott.
- Ribeiro, M. D. (1982). Diet and pregnancy toxemia: New thoughts on an old problem. Public Health Review, 10, (2), 149-167.
- Russell, P. T., & Shade, A. R., (1974). Prostaglandins in the toxemia of pregnancy. Journal of Obstetric, Gynecologic and Neonatal Nursing, 3 (5), 52-53.
- Singapolice, D. O., Feld, S., & Harrigan, M. D. (1983). Effective prevention of gestational hypertension in multiparous women at high risk as identified by the roll-over test. American Journal of Obstetrics and Gynecology, 146, 166-168.
- Sonstegard, L. (1979). Pregnancy-induced hypertension: Prenatal nursing concerns. Maternal Child Nursing, 4, 90-95.

- Thurnau, G. R., Dyers, A., Depp, O. R., & Martin, A. O. (1983). The development of a profile scoring system for early identification and severity assessment of pregnancy-induced hypertension. American Journal of Obstetrics and Gynecology, 146, 406-416.
- Tichy, A. M., & Chong, D. (1979). Placental function and its role in toxemia. Maternal Child Nursing, 4, 84-89.
- Tompkins, W. T., Wiehl, D. G., Mitchell, R., (1955). The underweight patient as an increased obstetrical hazard. American Journal of Obstetrics and Gynecology, 69, 114-123.
- von Bertalanffy, L. (1973). General Systems Theory (rev. ed.) New York: George Braziller.
- Wheeler, L., & Jones, M. B. (1981). Pregnancy-induced hypertension. Journal of Obstetrical, Gynecologic and Neonatal Nursing, 10, 212-231.
- Willis, S. E. (1982). Hypertension in pregnancy: Pathophysiology. American Journal of Nursing, 82, 792-797.
- Willis, S. E., & Sharp, E. S. (1982). Hypertension in pregnancy: Prenatal detection and management. American Journal of Nursing, 82, 798-808.
- Yura, H. & Walsh, M. B. (1983). Nursing Process (4th ed.). Norwalk: Appleton-Century-Crofts.

Appendixes

Appendix A

IDEAL WEIGHT ACCORDING TO HEIGHT FROM THE
METROPOLITAN HEIGHT-WEIGHT TABLES
1983

<u>Height (in inches)</u>	<u>Ideal Weight (In Pounds)</u>
57	115
58	117
59	119.5
60	122
61	125
62	128
63	131
64	134
65	137
66	140
67	143
68	146
69	149
70	152
71	155

Appendix B

LETTER REQUESTING SITE APPROVAL

508 Glenwood Drive
Chesapeake, Virginia 23320

Dear _____,

My name is Maryellen Remich, and I am studying for a Master's Degree in Nursing at Old Dominion University. For my master's thesis, I am studying weight gain patterns in pregnancy as they relate to the development of pregnancy-induced hypertension.

I would like to ask permission from the _____ to utilize the _____ charts of past obstetrical clients seen through your maternity clinic.

I plan to utilize the weights, heights, and blood pressures of the OB clients. In addition, I would like record age, race, and marital status.

At the completion of the thesis, I would be happy to share the results with you. Hopefully, my results will be beneficial to nursing practice.

Sincerely,

Maryellen C. Remich, RN, BSN, OGNP

Appendix C

DESCRIPTION OF THE STUDY

This ex post facto descriptive research study will examine the influence of three factors: (1) pregravid weight to ideal pregravid weight ratio, (2) pounds gained during the first twenty-eight (28) weeks of pregnancy, and (3) maternal age, on the probability of development of pregnancy-induced hypertension (PIH) during the last trimester. The literature review reveals significant correlations between low weight gain during pregnancy and small for gestational age babies. It also reveals an increased risk for PIH development with extremes in maternal age and maternal blood pressure changes in the second trimester. The criteria for diagnosing PIH was not consistent throughout the literature and the American College of Obstetrics and Gynecology's (ACOG) criteria was rarely applied.

In this study, the medical records of low risk primigravidas who have completed their pregnancies will be examined. ACOG's criteria for PIH will be utilized. Multiple regression procedures will be utilized to determine if significant correlations exist.

Appendix D

OLD DOMINION UNIVERSITY
DEPARTMENT OF NURSING

INFORMED CONSENT FORM

PROJECT NAME: _____

INVESTIGATOR: _____
DATE: _____

This is to certify that the Chesapeake Public Health Department hereby agrees to participate in a scientific investigation as a part of the educational and research program of Old Dominion University, under the supervision of _____
_____.

(Faculty Person/Principal Investigator)

The investigation and the nature of the public health department's participation have been described and explained and that I, as the department's supervisor, understand that explanation. (See attached Description of the Study). It is understood that the department may withdraw from the project at any time, without penalty or prejudice.

The public health department has been afforded the opportunity to ask questions concerning the purpose of this project and all such questions have been answered to my satisfaction. It is understood that any additional questions in the future about this project or the manner in which it is conducted will be answered by contacting _____

(Faculty Person/Principal Investigator)

at _____.

(Telephone Number)

It is understood that the public health department is free to withhold any information that it deems necessary. It is further understood that the following protocol will be followed to safeguard the client's confidentiality.

1. Clinic personnel will pull charts,
2. Charts will be reviewed by the researcher to determine if it meets the criteria for the study,
3. Each chart meeting the criteria will have an unrelated number assigned to it on the data collection sheet only,

4. Data from the chart will be recorded on the data collection sheet next to the assigned number. These data will include:

- a) height,
- b) pregravid weight,
- c) weights throughout the pregnancy,
- d) blood pressures throughout the pregnancy,
- e) age, and
- f) demographic data.

5. This will be done in a private area,

6. Charts will be refiled by clinic personnel,

It is understood that the data will be reported in aggregate form only. No individual data sets will be used.

The benefit of this study to the agency is participation in research which is designed to increase the understanding of risk factors for PIH development. This is a significant problem in the maternity population which public health departments serve.

It is understood that the Chesapeake Public Health Department may request a copy of the results of this

research project and that a copy, if requested, will be provided to it free of charge.

It is understood that the Chesapeake Public Health Department has the right to contact the Old Dominion University Institutional Review Board for the Protection of Human Subjects should it wish to express any opinions regarding the conduct of this study. It is understood that all or portions of the records concerning this study may be reviewed by the U. S. Food and Drug Administration.

Signature/Supervisor

Date: _____

Chesapeake Public Health Department

Witness

Date: _____

Appendix E

DATA COLLECTION SHEET

57

Number	Age				Marital status				Race			
Weeks												
BP	/	/	/	/	/	/	/	/	/	/	/	/
MAP												
Weight												

MAPD _____ Prorated weight (28 wks) _____ Pregravid weight ratio _____
 Height _____ Weight gain (28 wks) _____ Pregravid weight _____

Number	Age				Marital status				Race			
Weeks												
BP	/	/	/	/	/	/	/	/	/	/	/	/
MAP												
Weight												

MAPD _____ Prorated weight (28 wks) _____ Pregravid weight ratio _____
 Height _____ Weight gain (28 wks) _____ Pregravid weight _____

Number	Age				Marital status				Race			
Weeks												
BP	/	/	/	/	/	/	/	/	/	/	/	/
MAP												
Weight												

MAPD _____ Prorated weight (28 wks) _____ Pregravid weight ratio _____
 Height _____ Weight gain (28 wks) _____ Pregravid weight _____

Number	Age				Marital status				Race			
Weeks												
BP	/	/	/	/	/	/	/	/	/	/	/	/
MAP												
Weight												

MAPD _____ Prorated weight (28 wks) _____ Pregravid weight ratio _____
 Height _____ Weight gain (28 wks) _____ Pregravid weight _____